jurnal 15

by Darmawijoyo Darmawijoyo

The Legend of Kemaro Island for Supporting Students in Learning Average

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Abstract

This research is aimed to determine the role of Indonesian folklore context namely the Legend of Kemaro Island in supporting average learning on 6 grade students with Pendidikan Matematika Realistik Indonesia (PMRI) approach. The method used is a design research that contains three stage namely preliminary design, teaching experiment, and retrospective analysis. Results from the research shows that Indonesian folklore context can support students to develop their knowledge in the concept of average. Strategy and model (emergent modeling) that students discover, describe and discuss the construction or contribution shows how students can use to help their initial understanding of the concept of average.

Key words: The Legend of Kemaro Island, PMRI, average

Abstrak

Penelitian ini bertujuan untuk mengetahui peranan konteks cerita rakyat Indonesia yaitu Legenda Pulau Kemaro dalam mendukung pembelajaran rata-rata di kelas 6 dengan pendekatan Pendidikan Matematika Realistik Indonesia (PMRI). Metode yang digunakan adalah design research dengan tahap preliminary design, teaching experiment, dan retrospective analysis. Hasil dari penelitian menunjukkan bahwa cerita rakyat Indonesia dapat mendukung siswa untuk mengembangkan pengetahuan mereka tentang konsep rata-rata. Seluruh strategi dan model (emergent modeling) yang siswa temukan, gambarkan dan diskusikan menunjukkan bagaimana konstruksi atau kontribusi siswa dapat digunakan untuk membantu pemahaman awal mereka tentang konsep rata-rata.

Kata kunci: Legenda Pulau Kemaro, PMRI, rata-rata

Introduction

Statistics widely applied in various disciplines, for example natural science, business and industry. Almost every decision made in the field of politics and economics of using a statistical reasons (Bakker, 2004). Therefore, the statistics need to be introduced to students early on. About teaching and learning activities in elementary statistics in general emphasizes concentration on the size of the data average and mode.

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According to Bakker (2004) stated that the average is the basic concept is very important for students when they first learn to measure the concentration data. But the process of learning the concept of average largely done by giving the formula directly without first learning about the basic concepts and procedures are meaningful for students (Groth, 2006). Teaching-learning process such as this raises for understanding low that it will further lead to students experiencing learning difficulties and errors in the average.

Furthermore, based on the above problems we need a way of learning the concept of an average of interesting and meaningful to students so they become more motivated to learn, both about the basic knowledge and concepts. Learning approach is in line with *Pendidikan Matematika Realistik Indonesia* (PMRI). PMRI learning activities in accordance with one of the principles of curriculum development that is centered on the students (student center) while the teacher is only as facilitators. PMRI is developed according to the context or cultural values that exist in Indonesia.

According Gadanidis and Hoogland (2002) explained that the story could be a context for the story is a form of thinking and communicating naturally and provides a meaningful way to talk and think about teaching and learning mathematics. Researchers chose Legend Kemaro Island as a starting point because in the story there is a mathematical value that can be raised is introduced to the students about the diversity of data and average values and character education. Researchers provide an alternative concept learning problems in the average by designing and developing students' learning trajectories of island legend Kemaro as context associated with the concept of average PMRI approach.

We use some theoretical basis to support this research are: learning basic concepts in the average underlying designing a series of learning activities on the track, PMRI as the approach used in research, and folklore of Indonesia which is used as the basic concept of context in establishing the average in students.

The average is one of the concept of convergence in the size distribution data is interpreted as a fair (fair share) (Franklin and Mewborn, 2007., Kader and Mamer, 2007). A series of activities that illustrate the progress of learning and thinking processes of students in the learning process on average need to be developed or designed to facilitate learning activities.

According to Cobb and Hodge (2002) mentioned that there are two important aspects that must be considered in the process of learning about the average, namely: 1). The ability of students to understand their position or role when studying the concept, which means that students need to be involved in learning the concept of the average so that learning activities will be more meaningful to them. It also fits with the theory that learning requires a student experiences gained through activities (experience-based activities) (Wijaya, 2008). 2). Effective data based on the description of the problems that students need reasonable and can be imagined by the students which means that the context to introduce the data used in the context of the problem is an acceptable fit in mind and is not unfamiliar to students. If the data used is realistic data then students will be more interested in learning about the mean because they can find solutions to these problems based on the given context.

Furthermore, Franklin and Kader (2010) states that the basic concept in the learning process on average that should be contained in a series of learning activities on the track are: 1). Students understand the purpose of dividing the fair "fair share" of a set of different numeric data (data range), 2). The value of the results apportion also referred to as an average, 3). The formula for finding the average. Philosophy or principles in the PMRI approach in line with the philosophy that exists in RME. Philosophy or principle in the first RME Freudhenthal delivered by Hans, a Dutch mathematician, in the 1970's and then used in Indonesia as a theoretical basis in PMRI. Two important ideas from him is "mathematics as human activity" and "mathematics must be connected to reality" (Zulkardi, 2002).

According Gravemeijer (1994) there are three principles in designing learning based on RME and then adopted into PMRI principles, namely: 1). Guided reinvention and progressive mathematizing, 2). Didactical phenomenology, 3). Self-developed models. Furthermore, in Wijaya Treffers (2008) states that there are five characteristics of RME which later became characteristic of PMRI in Indonesia, namely: 1). Phenomenological exploration or the use of Contexts, 2). Using models and symbols for progressive mathematization, 3). Using students' own construction and production, 4). Interactivity, 5). Intertwinement.

Folklore not only serves as a means of education and moral character, but also could be in the context of learning mathematics using PMRI approach. One of folklore that can be used as the context is Legend island Kemaro because in the story there are

problems that can be raised to introduce students to the concept of average in learning statistics. Folklore will also be a context that appeals to students because it will emerge a sense of ownership when the story came from her neighborhood.

Legend Kemaro Island is a legend that tells of the origin of the island Kemaro in Palembang, South Sumatra, Indonesia. According to the story of the island is the embodiment Siti Fatimah, the daughter of the King of Srivijaya, which plunged into the Musi River. This legend is very popular among the people of Palembang and Tiongha.

This study uses research methods research design as a tool to answer the problem formulation in order to reach research goals. Simonson (2006) defines research design as a method of systematic and flexible research and aim to improve the quality of education through the analysis of repetitive (iterative analysis), to design or improve the previous design, and implementation (implementation) based on the cooperation between researchers and implementers in field (daily life settings), and refers to the design theories and principles are contextual. Gravemeijer and Cobb (2006) states that there are three stages in the implementation of research study design, namely: 1). Preparing for the Experiment 2). Teaching Experiment, and 3). Retrospective Analysis.

Results and Discussion

At the early stages of research, carried out literature review and compiled a series of student activities to achieve an average concept of the informal stage to the formal stage. The student activities are objective activity, activity descriptions, and allegations of student thinking (konjecture), forming the alleged trajectory of student learning (hypothetical learning trajectory). The results of this design are discussed with the math teacher or teacher model is then applied in a preliminary study (pilot experiment). Having carried out preliminary studies, researchers conducted a revision or improvement of the design have been made based on the results have been obtained and discussions with teachers.

Teaching experiments performed to determine the role of folklore Indonesia in supporting learning at an average grade 6 with PMRI approach. Teaching experiment carried out in 6th grade consisting of 34 students. Before learning begins, the teacher asks the students about the context of the folklore of the Legend of the Island Kemaro

Palembang. Then the students listened to a recording which tells about the legends and ask students to record information relating to mathematics courses. Furthermore, students are asked to solve three problems that are used to guide the students understand the basic concepts on average.

Figure 1. Strategy of green group

The first problem is that students were asked to present data that exist in gold bullion based on the legend of the Kemaro Island jars into a bar chart form. From the first issue appeared two kinds of strategies students use in solving problems of the unit of the scale in Cartesian diagram like Figure 1 and the scale in any cartesian diagram as shown in Figure 2.

Figure 2. Strategy of blue group

Strategies students by using a unit demonstrated the ability of students in solving problems that made using situational activity. Students first draw the gold bars that exist in the Legend of the Island Kemaro in a rectangle drawn upward, forming a bar chart. From the results of student work can be seen that the legend of the island Kemaro menyelesaian greatly help students in a given problem.

The results of student work by using a strategy of scale in Cartesian diagram such as Figure 2 shows a more formal thinking ability that emerges from the students. They were able to describe the composition of gold bullion is in the jar without using a unit first. Many of the gold bars in each array can be directly known by looking at the top of the rod which is connected with dashed lines to the vertical axis in the Cartesian diagram. This indicates a higher visualization capabilities of a given problem.

The second problem posed to students is to equate high bar charts they have created based on existing data in the Legend Kemaro Island. Terms are given high amounts of all the rods before and after equated equated are the same. There are three kinds of methods used by students to solve this problem. First, they use a bar chart created by a unit. Secondly, the problems solved by starting a bar chart without a unit, then when a unit is made of high equalize. And lastly, students cut the stems are the same.
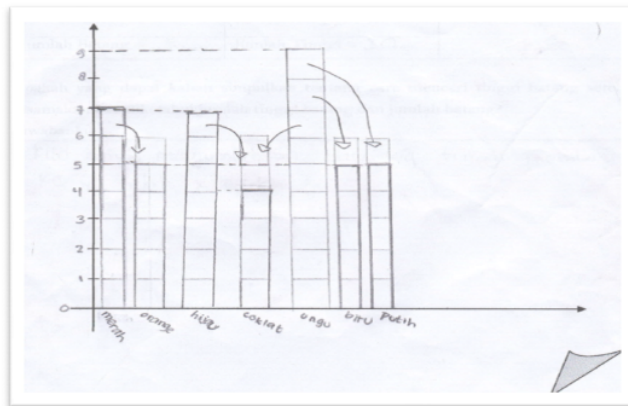

Figure 3. Strategy of purple group in average learning

How to solve problems by using a bar chart that has been partitioned into units unit can be seen in Figure 3. From interviews with students who completed these problems, it is known that they have difficulty solving problems when beginning to read about. Then they used the help of corks shaped beams with the same size was

distributed at the beginning as a representation of the gold bars in the legend Kemaro Island. Corks are stacking them up according to that done by the King of China so as to form a bar chart. Then they move the cork one by one from the highest to the arrangement of the composition cork cork lower till all be the same height. The strategy that appears to solve both problems show how to determine the average at the informal stage with the help of the tool models.
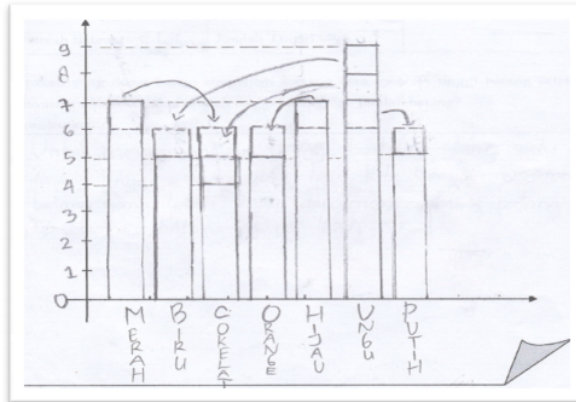

Figure 4. Strategy of brown group in average learning

The second strategy by using a unit on the top or peak as shown in Figure 4. Students at the beginning of the work a matter of making the trunks without the use of a unit. After all the rods is completed, they then seek the highest stem and make a unit in accordance with the scale that they have created in the Cartesian diagram. A unit that has been created and then moved to the lower trunk and then repeated again on the stem to the other until all the rods to be the same height. This strategy demonstrates the ability of students is more formal than before because they do not need to create a unit in the trunk that has been made.

Settlement problems done by cutting the stalks as Figure 5 shows the ability of students to solve problems in a way that is more formal than the way shown by the students as in Figure 3 and Figure 4. Students solve problems without using the help of existing corks. They immediately noticed the existing scale in Cartesian diagram showing the high of each bar. Then students cut the rod high and connect to the rod low and repeated until all the rods to be the same height.

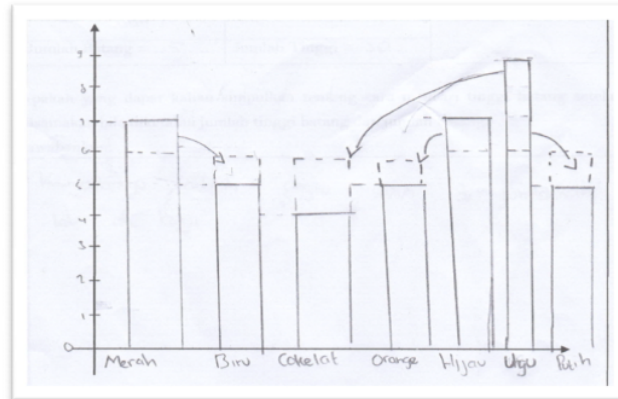Lestariningsih, Ratu Ilma Indra Putri, Darmawijoyo

Figure 5. Strategy of red group in average learning

The last problem is given to students is to fill a table based on the legend of the island Kemaro and concluded the contents of that table. Students managed to draw conclusions about how to determine the average number of all the gold bullion that is shared with many jars. After class discussion, they came to the conclusion that more knowledge about how to determine the average is the sum of all data shared with a lot of data.

Considering the aforementioned explainetion, it is generally known that this study has shown that the legend of the island Kemaro have an important role in supporting the learning process statistics. Island legend Kemaro can be a starting point (starting point) in helping students understand the basic concepts in statistics. Problems that are associated with the legend of the island Kemaro very attractive to students so that they follow a series of activities designed with great enthusiasm. This is because the students had never heard of or know the legend of the Island Kemaro so the story becomes a realistic context for students.

Learning trajectory on average by using the legend of the island Kemaro done starting from the development of students 'skills of existing data in the Legend of the Island Kemaro students' skills on a formal stage. Island legend Kemaro concentration measure used in the learning stages of situational data as well for students to cut and connecting rod activity and the activity of many gold bars are often incorporated into the jar. King of Chinese students help to make the arrangement of gold bars in a jar to be as much or specify the amount of gold bullion are most commonly inserted into the jar of China King.

Furthermore, the achievement of students to stage the activity referential cutting and connecting rods are indicated by the ability of students to change the arrangement of different cork into the same height. Phase referential also shown by the results of student work in changing the bar chart prepared by using a unit into the same structure as high.

Then the results of student work in changing existing bars in the bar chart shows the same high achievement students to stage a general (model-for). At this stage students are able to determine the arithmetic mean of the data provided a more formal premises of the referential stage.

Moreover, the activity of filling the table as a bridge between the informal stage of the formal stage in learning. The ability of students to draw a conclusion from the table into a means to rediscover the formula for determining the arithmetic mean is then used for students to solve problems. This indicates that the student has reached a formal stage in the activity of cutting and connecting jars.

Conclusion

The use of the context of Indonesian folklore provide a very significant effect in maintaining motivation and interest in learning the concept of average. If viewed mathematically, the use of context is able to bring students to rediscover (reinvent) and understand the basic concepts of average. This context guides the students to explore and use the information in it to solve problems.

Topics on average better not to be taught by giving the formula directly but students must be given the opportunity to understand the meaning of a fair share (fair share). Island legend as folklore Kemaro Indonesia is a very appropriate context for the preliminary stages of teaching and learning in learning the concept of average. Through the preliminary activities that use cork as a representation of the pile of gold bullion in the situational phase, students gain a deeper knowledge of the basic concepts on average. In a more formal stage, they were able to turn the stalks in a bar chart to be equally high or flat.

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